THE ENERGY SERVICES AGREEMENT: AN APPROACH TO ENERGY CONSERVATION AND MANAGEMENT IN A MULTI-BUILDING, MULTI-USE FACILITY

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ABSTRACT

The Texas Southern University case study describes an innovative conceptual approach to comprehensive energy management involving an agreement with a qualified energy services company to install a building automation system (BAS) and energy conservation measures (ECMs) campus wide and provide staff training, supplementary maintenance and guarantees of savings achieved. This is accomplished through a three-stage process of qualification, preliminary selection, and contract negotiation. TSU's approach relies on the service company to provide the engineering, but uses an oversight engineer to provide project integrity. In TSU's case, financing was not required and supplementary maintenance has been rebid. The University was able to capitalize on Federal funding and renovation monies to help make the approach an initial success.

INTRODUCTION

Texas Southern University, established in 1947, is one of two institutions in Texas predominately serving the educational needs of Black Americans. The University offers baccalaurate degrees in fifty (50) fields and houses graduate schools in pharmacy and law. The graduate school currently offers twenty-six (26) masters and six

employs 940 faculty and staff. It is housed in forty-one (41) buildings on an urban campus of 118 acres. Rapid growth in enrollments during the late 1960s and 70s fueled by increased opportunities for Black and other minorities led to the impetus for doubling the size of the TSU's physical plant since 1975. By 1980, however, the U.S. Civil Rights Commission required Texas to examine the affects of three decades of underfunding, and ensuing facilities studies by independent engineers found the condition of the existing campus buildings to be "deplorable".

During the period of underfunding, regard for energy conservation was minimal because regardless of the size of TSU's utility bills, the Legislature always appropriated enough to pay them. Energy efficiency of buildings was largely the result of the skill of the architects and engineers who designed the building, and supervision of the contractors who constructed them. Preventative maintenance suffered from a lack of funding and supervision. A huge backlog of deferred maintenance developed. Renovations, often done to provide more comfort than efficiency, tended to compound the energy problems caused by ineffective maintenance.

Committed to making Texas Southern "catch up" in the quality of its facilities, in comparison with six "sister" State institutions, Texas had provided $100 million in this decade to construct new, state-of-the-art buildings and fully renovate all major existing buildings. These funds have enabled the appointment of a director of energy conservation, and a concerted effort to track consumption; to identify, evaluate, engineer, and to install conservation measures; and to provide the staff and infrastructure to do preventive maintenance and manage conservation.

The cost of TSU's energy use peaked in 1983. Reductions since have been partly the result of lower fossil fuel costs. The same benefits have caused extreme hardship to Texas' ability to raise funds for higher education, leading to deep cuts in the operating funds of the University. Texas Southern has a brief period of capital funding to be innovative and reduce consumption, to automate preventive maintenance, and to establish a conservation attitude before energy costs rise again. This paper outlines a way to achieve these ends, using a concept called an "Energy Services Agreement."

In 1983 when energy costs of the University peaked at $2,713,000, TSU was approached by companies who promised to reduce our energy costs for a 50% share of the savings. This idea had two flaws: 1) There was no precedent or legislation for "paying back" expenditures for equipment or services from "future" funds as yet not appropriated, and 2) The idea that 50% of all benefits (however large) would go to a company who would largely determine their own fee.

At the same time, the Texas Public Utility Commission (PUC) funded studies of the campus which conservatively estimated that TSU could realistically expect to save $800,000 (34.2%) of a yearly $2,600,000 energy bill by establishing good maintenance practices and installing energy conservation measures in buildings.

Texas Southern has a central heating and cooling system, established in 1962 when the central plant and tunnel system was constructed. Recently the heating and cooling capacity of the plant has been nearly doubled through complete

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renovation of the existing plant and construction of a satellite plant serving the West campus. Current plans call for the two plants to be "tied together" for back-up capacity in a looped system.

While the central system does not serve all of the buildings, it represents 95% of campus energy consumption and the lion's share of savings opportunity. However, the Cost Containment (Texas) and the Institutional Conservation Programs (ICP/DOE) which the University has participated in have focused on individual buildings. Audit requirements which are difficult to fund also hamper involvement in ICP.

Fortunately, after an initial walk-through audit by Texas A&M is Engineering Extension Service, the Texas PUC conducted a study of 14 buildings and the central plant on campus in 1984. Sixteen (16) measures were identified, but funding to study their effectiveness and put them in service needed to be identified.

An engineering firm was then selected through competitive proposals to conduct two Technical Assistance studies in fifteen (15) buildings under the Institutional Conservation Program in 1986 and 87. These studies identified over 100 measures which could be undertaken. Of these, 24 were funded by an Energy Conservation Grant in 1987.

In the meantime, the plant and other buildings had received funding for renovation through various appropriations, providing the means to engineer and install some of the identified measures. Because of the narrow scopes of work involved in each ECM, the use of piece-meal individual projects seemed to be less than optimal for installing uniform measures campuswide.

In 1985 the Texas Public Building Authority (S.B. 4435) attempted a bond issue to fund major projects in several universities, including TSU, determined by the first Cost Containment Program. The bond issue failed because of the bond market and other factors, but it pointed to a way TSU could implement a campuswide program.

A SOLUTION: THE COMPREHENSIVE APPROACH

The University learned of an approach developed in Michigan to use savings to finance the installation and maintenance of measures campuswide. The process involved soliciting energy service companies with an RFP, then selecting one of the companies to conduct a detailed audit of all facilities and negotiate a final agreement. The agreement would be multi-year and involve a third party to finance installation cost. The agreement could also involve guarantees by the service company to "pay the difference" if savings were not achieved. This guarantee was sometimes provided by an insurance company.

Like the earlier "savings- sharing" approaches, this process had flaws: 1) The "you tell us what you'll do" approach and 2) The potential for excess profits to the service company via their control of the audit and the measures to be installed, their determination of the actual savings, and their control of financing.

Unsure of the total amount of funding TSU would ultimately have to accomplish the work but with a firm grasp of what we needed to do, the University chose a revised approach:

1. Oversight Engineers. TSU used a competition to select an engineering firm to conduct eight (8) tasks to ensure that the service company would engineer and install all systems in the best interest of the University. Seven (7) firms competed via RFP for a contract to conduct eight (8) specific tasks.

2. Scope of Work. TSU defined the scope of work to include an automated building control system for 36 buildings, the funded ECMs under the DOE/ICP program, extension of the identified measures on the fifteen (15) buildings which had been technically analyzed (TAed) to an additional 21 buildings, staff organization and training, supplementary maintenance and other measures and services identified as cost-effective by the proposing company.

3. Request for Bid Proposal (RFBP) TSU added the "bid" requirement to the RFP to ensure that competitive bidding would take place on those items funded under the DOE/ICP ECM grant. Once a firm had been selected, the second version (after audit) of the package was required to be within 10% of the original amount bid.

4. Options for Payment. Because all sources of funding were uncertain, TSU required detailed first cost of each item in each building and the present worth of all costs to be spread over the life of the contract (such as maintenance). Through this option, the University hoped to buy "up front" maintenance services (extended warranty) and avoid yearly maintenance contracts charged to operating budgets.

The process described is underway. Bids were received in September, 1986. Funding uncertainties delayed selection of a firm until January, 1987. The University selected a service company based on their qualifications and "engineered" savings in the 36 buildings. The University has chosen engineered over "guaranteed" or "insured" savings because of added cost caused by the inherent risk to the service company in the latter two.

Negotiations proved more time-consuming than anticipated, but the University obtained Higher Education Assistance Fund (HEAF) bond monies to entirely pay for the cost of the scope of work, currently nego- tiated to $3,010,272. The scope of work is being installed over the next two (2) years (phased with on-going renovations) and is

engineered to save about $1 million per year. The "front end" for energy management and lighting control have been designed, and the trunking and lighting control is being installed. Lighting and other retrofits are being scheduled for installation in conjunction with building renovations. A staff training program is paralleling the installation.

EVALUATING THE APPROACH

The following analysis describes how Texas Southern University's program met the evaluation criteria for a State Award in 1987 in the DOE's Energy Conservation Innovation Awards Program.

The Energy Services Agreement approach at Texas Southern University is innovative because it makes efficient use of a variety of resources to provide a comprehensive retrofit of campus facilities for energy conservation. Unlike most programs and funding sources which focus on individual buildings, TSU's program addresses all measures which are cost-effective campuswide. Each project in each building is evaluated for its benefits over the life of the installation rather than the simple payback.

The use of oversight engineers is unique for this type of project. Oversight engineers check the payback calculation, design, and installation of the project at a fraction of the cost of design engineers, yet provide the public with assurance that professional, qualified and licensed engineers are involved in the process. The University has also employed project managers to manage the coordination of the project with many ongoing renovations underway and attend to details like inspections and change orders.

The use of a ten-year time frame and optional pricing for up-front buyout of cash flows for future maintenance and other services gives the University the option of purchasing all or part of the equipment with renovation monies, thereby guaranteeing the long-term performance of the equipment or service (i.e., scheduled preventive maintenance) without yearly bidding or service contracts and emergency repairs charged to limited operating budgets. For any part of the campus without up-front renovation funds (i.e., auxiliaries) the process allows that portions of the project to be financed at a competitive rate with future yearly debt service and engineered energy savings clearly known in advanced.

Staff development is an integral part of the changeover to energy awareness and facilities automation. The project contains an individually-tailored program of training for all persons at the University interacting with the automated system or the retrofits, as well as providing good HVAC and other maintenance skills essential to operate equipment efficiently.

Additional aspects of this particular project which do not have energy-saving value, but provide benefits include: 1) Building-by-building monitoring of energy consumption, 2) automatic security, failure, and condition monitoring, 3) automatic PM work order system, 4) automatic door-locking, 5) PCB detection (light fixtures) and removal, and 6)improved working environment.

ENERGY SAVINGS

The current scope of work puts savings on the order of $1,000,000 per year if energy costs remain constant. This figure is more than TSU's current building maintenance budget. If the State Legislature allows the University to spend these savings on programs currently underfunded, then other areas of the University will benefit from our efficiency.

TRANSFERABILITY

The approach used by TSU is available for use by other multi-use, multi-building institutions which cannot afford to do energy conservation on a piece-by-piece, measure-by-measure fashion. The potential user must have an administration committed to pay for the process, an individual willing to carry the project through long preparation and negotiation, and enough legal and technical assistance to avoid selecting the wrong service company or paying too much for its services.

ECONOMIC IMPACT

Texas is undergoing a period of severe cutbacks in operating funds to its institutions of higher education. Not only will the comprehensive approach described provide nearly one million dollars back to TSU each year for badly-needed services, but the process transferred to other state institutions could provide millions of more dollars, year-after-year statewide. Nationwide, the process could yield hundreds of millions of dollars in avoided costs. As electricity costs rise and oil and gas inch back to 1983 prices, the benefits of actions well taken now will only increase.

CONCLUSION

Texas Southern University's experience thus far indicates that the energy services agreement approach is an efficient way to achieve comprehensive savings in a multi-building facility. However, potential users of this approach must do a lot of preparation and specification of what they want to do prior to issuing the RFBP. There are many ways companies can steer their proposals into costly, but inefficient installations. Good, independent engineering audits will prevent this. The University's experience indicates that it is important to get the company to state its profit in the bid proposal. TSU was unable to do that, and it prolonged negotiation for the contract and eliminated supplemental maintenance in the initial agreement.